

REMARKS

Status

Claims 7, 12, 13, 16, and 20-34 are cancelled by a previous amendment. Claims 1-6, 8-11, 14, 15, 17-19, and 30-50 have been canceled herein. Accordingly, claims 1-50 are canceled. Applicants reserve the right to pursue the claimed subject matter of claims 1-50 in a co-pending application. Claims 51-55 have been added herein and presented for consideration.

Claim Amendments

Support for claims 51-55 can be found throughout the application and original claims. In particular, support may be found by way of non-limiting examples on pages 14-15 of the specification. Applicants certify that no new matter under 35 U.S.C. §132 has been added by way of this amendment.

Rejections under 35 U.S.C. §103

The Examiner has made several rejections against now canceled claims 1-6, 8-11, 14, 15, 17-19, and 30-50 as being unpatentable under 35 U.S.C. 103(a) over Hasselbrink, Jr., *et al.*, (US 6,782,746 B1 "Hasselbrink") in view of Provin, *et al.*, (IEEE Transactions, January 2002, Vol. 25, No. 1, pp 59-63 "Provin"), and other references as described in the Office action mailed Sept. 13, 2006. Applicants respectfully traverse these rejection for the following reasons.

Although the rejected claims above have been canceled by this amendment and claims 51-55 have been added, Applicants have addressed the Examiner's concerns against the canceled claims below.

NO PRIMA FACIE CASE FOR OBVIOUSNESS

The Examiner's combination does not make a prima facie case for obviousness under 35 U.S.C. §103 because that combination does not contain each and every element of the claimed invention nor a motivation to combine with a reasonable expectation of success. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d

1438 (Fed. Cir. 1991). Applicants respectfully assert that the Examiner has engaged in improper “hindsight” reconstruction of Applicants’ claimed invention. The following arguments further support Applicants’ assertion.

Hasselbrink/Provin Combination Deficiencies

The claimed invention recites the addition of polymeric particles to a monomer solution to make polymer-polymer composite mobile monolithic elements.

Provin do not teach or suggest adding a polymeric particulate to a monomer solution to produce polymer-polymer composite flow control elements.

Provin disclose only using alumina, a ceramic precursor, to a monomer solution to make a ceramic-polymer composite device. Nowhere in Provin is it disclosed or suggested to use polymer particles in place of ceramic particles.

“Desired Mechanical Properties”

The Examiner states, in part, that Provin discloses adding “particulate filler material” . . . “to provid[e] desired mechanical properties enabling their use as micro-components.” Provin however, never discloses what those desired mechanical properties are, and if more than one, how to achieve a specific mechanical property that is “desired”. Provin discloses that adding the alumina “improves mechanical properties” of the micropart, and that if the “green body” is sintered, thus removing any polymer and making that part purely ceramic, must be done to ensure the mechanical and thermal properties of the micropart, even though no specific properties are mentioned.

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). The claimed invention utilizes polymeric particulates, not mineral or ceramic particles as described in Provin. If one were to substitute the ceramic particles in Provin with the polymeric particles of the claimed invention, then the microparts of Provin would not withstand sintering to form a ceramic micropart. Because Provin seeks only to make ceramic composite polymer microparts,

there is no teaching or suggestion to use a polymer particle instead. Applicants believe the Examiner has used Applicants' specification as the source of motivation to change the ceramic particles of Provin for the polymer particles of the claimed invention.

Mechanical Properties vs. Chemical Properties

Provin discloses methods for making ceramic-polymer composite microparts by adding alumina, a ceramic precursor, to a monomer solution and conducting stereolithography using that mixture to form the microparts. The reason stated for adding the alumina to the monomer is to limit the depth of penetration to increase the vertical resolution of the stereolithographic process. It is also disclosed that the addition of alumina without sintering increases the mechanical properties of the micropart without specifying what mechanical property or properties are increased and in what manner. Moreover, Provin teaches away from using the microparts without sintering (to make them ceramic).

The resulting composite green body can directly be used or can undergo an appropriate thermal treatment, that is to say de-binding and sintering to ENSURE the final properties (thermal and mechanical) of the ceramic material (this step cannot be achieved successfully with as low ceramic loading as we are using in this paper). Even if ceramic parts present Better properties (thermal, mechanical), ceramic-polymer composite parts are interesting.

Provin, page 61, §III. (A.)

Applicants have discovered that by adding polymeric admix to a photopolymer to produce the composite mobile monolithic flow control elements of the claimed invention, the chemical resistance of the mobile monolithic structure is improved.

The Examiner points to the improved mechanical properties of Provin:

Provin discloses that it is known in the art to use particulate filler material such as ceramic powder with a liquid monomer for the purposes of providing the manufactured article *with desired mechanical properties* enabling their use as

micro-components.

Provin (page 59, column 2) cited in the Office action mailed 9/13/2006, page 4, second paragraph. (Emphasis added)

Here, the Examiner is equating mechanical properties of Provin to the improved chemical properties of the instant claimed invention. It is well-settled that mechanical properties are distinctly different than chemical properties.

Sintering of Minerals to Form Ceramics

Even if mechanical properties equated to chemical properties, Provin teach away from making the Examiner's Hasselbrink and Provin combination because, in part, Provin teach that to make a ceramic-polymer composite micropart, the part must undergo "sintering to **ensure** the final properties (thermal and mechanical) of the ceramic". Moreover, Provin clearly state that "the sintering step could not be achieved successfully with the low ceramic loading" used in the reference. Provin, page 61, §III.A. Accordingly, the microparts described by Provin could not achieve the improved mechanical properties without the sintering step which results in a purely ceramic part since the polymer burns off during the sintering.

Minerals vs. Polymers

The required ceramic powder, alumina, of Provin is a mineral, not a polymer as in the claimed invention. Provin do not teach or suggest adding a polymer admix to make ceramic composite microparts because only minerals can form ceramics. Moreover, the passage in Provin cited by the Examiner states:

The ceramic powder is used because it decreases the penetration depth of the incident light, and thus improves the vertical resolution of the process. Moreover, the mechanical properties of the manufactured parts are also increased, and become sufficient to allow the manufactured microparts to be directly used as microcomponents. The time consuming sintering step is also eliminated.

Provin, page 59, column 2, first full paragraph. (Emphasis added)

Provin use alumina for two purposes; to primarily improve stereolithographic results, and to improve mechanical properties of the manufactured microparts. According to Provin, when using stereo-lithography to manufacture microparts, one should add alumina to limit the penetration depth of light to improve the vertical accuracy of the [photo-polymerization] process.

Provin, page 61, §2.

Improved Mechanical Properties Only After Sintering

As will be described below, the realization of the improved mechanical properties of the microparts of Provin comes only after sintering those microparts. Provin later compares the mechanical and physical improvements of un-sintered alumina in the final, unfired, part to those that are fired to turn the alumina into ceramic. Consequentially, those microparts no longer contain the polymer because the sintering heat has been burned off the polymer matrix.

Once polymerized, the photopolymer constitutes a through matrix around ceramic particles and confers the cohesion to the green body. The resulting composite green body can directly be used or can undergo an appropriate thermal treatment, that is to say de-binding and sintering to ENSURE the final properties (thermal and mechanical) of the ceramic material (this step cannot be achieved successfully with as low ceramic loading as we are using in this paper). Even if ceramic parts present Better properties (thermal, mechanical), ceramic-polymer composite parts are interesting.

Provin page 61, column 1 (§III.A). Emphasis added.

Provin furthers this point when disclosing that the un-sintered composite microparts are merely “interesting” but having improved mechanical properties. “Indeed, the ultimate goal is to produce not only composite but also pure ceramic microparts in order to improve their thermal and mechanical properties.” Provin, page 63, §V. “Perspectives”.

Appl. No. 10/666,466
Amdt. dated Nov 13, 2006
Reply to Office Action of Sep 13, 2006

CONCLUSION

For the foregoing reasons, Applicants believe the pending claims are now in condition for allowance. Accordingly, Applicants respectfully request a Notice of Allowance. If, in the Examiner's opinion, a telephone conference may be helpful, Applicants' counsel may be contacted at the number below.

Respectfully submitted
under 37 C.F.R. 1.34(a),


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